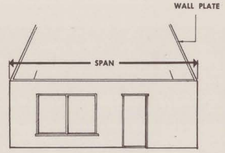
HOW TO BUILD THE SMALL HOMES COUNCIL'S 3/12-SLOPE TRUSS — 2′ ON CENTER, 20′-8″ to 30′-8″ SPANS



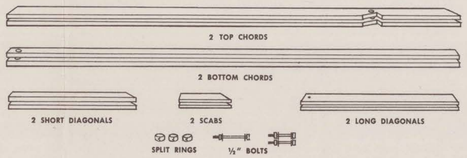
1 Determine the out-to-out dimensions of the exterior wall plates. This distance is the span.

MEMBERS†	PATTERN "A"
SPAN ➡	21′ 22′ 23′ 24′
Two Top Chords	Two 2″ x 6″ x 16′
Two Bottom Chords	Two 2″ x 4″ x 16′ / Two 2″ x 4″ x 23′ 8″

2 From the table of Member Sizes, determine the pattern ("A" or "B") on the basis of the out-to-out span. Locate member sizes as shown in example.

Example: A span of 23′ 8″ requires two 2″ x 6″ x 16′ members for the two top chords.

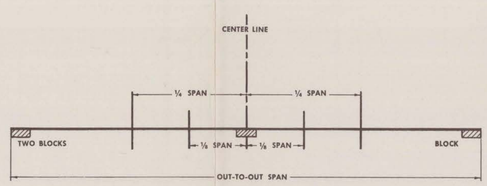
PATTERN "A" REQUIRES



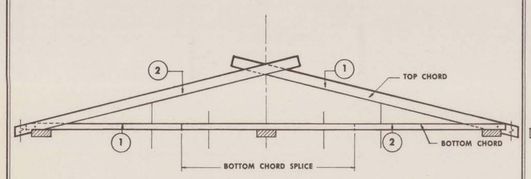
PATTERN "B" REQUIRES

ITEMS OF PATTERN "A" + 2 VERTICALS + SPLIT RINGS + ½″ BOLTS

3 Consult Cutting Diagram. Cut and drill all members necessary for one truss as shown for your span and pattern. Work from one end of the piece only.
Cut rafters so that crown of piece is opposite the notch.

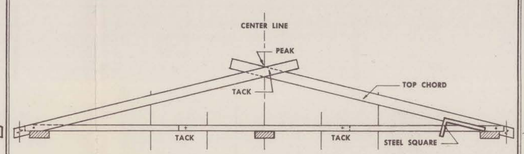


4 To construct jig, lay out chalk line equal to span and divide as shown in above diagram.
Nail 2 x 4 blocks so that their out-to-out dimension equals the span. At left heel joint, build up jig two blocks high to fit rafter notch.
Place block on chalk line at center of bottom chord.



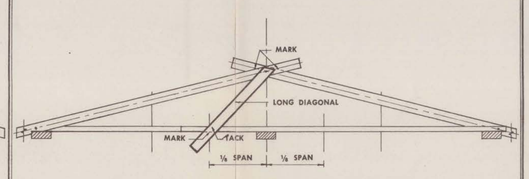
5 Place top and bottom chords approximately in position shown. Numbers indicate planes of respective members. Members marked ① are placed on deck; members marked ② are placed on those marked ①.

Bottom chords should be placed with crown up. Place rings and bolts in heel joints.

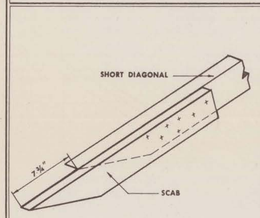


6 Check that each heel assembly fits tightly on its block. Tack bottom chord splice to hold in place temporarily. **Do not camber bottom chord.**

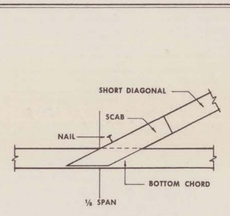
Move top chords until steel square shows a slope of 3 to 12. Check that top chords intersect on center line. Tack peak joint off center to hold in place while drilling.



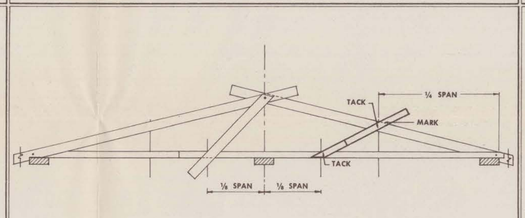
7 Locate intersection of top chord center lines. Drill 9/16″ hole at this point through both top chords and place bolt from underside. Place left diagonal over bolt as shown. Rotate diagonal until it intersects ⅛ span point on bottom chord. Tack to hold in place temporarily.
Mark cuts on diagonal and top chords.
Check that bevel cut on diagonal at peak will not interfere with roof sheathing.



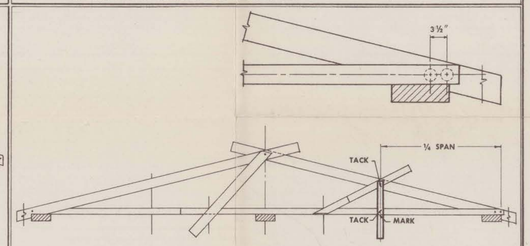
8 Nail 1″ x 4″ scab to short diagonal as shown. Left and right diagonals are identical.



9 Place short diagonal on right side of truss so that it is in tight bearing against bottom chord and positioned as shown in sketch. Nail short diagonal to bottom chord to hold bearing.



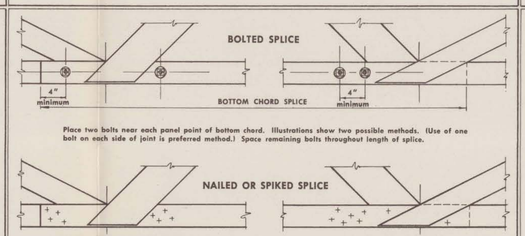
10 Tack scab to bottom chord. Other end of diagonal should intersect top chord approximately at ¼ span point. Tack diagonal to top chord. Mark cut on short diagonal.



11 For spans greater than 24′ 8″ use Pattern "B." Place vertical on top of right short diagonal and bottom chord. Tack and mark square cut.
At right heel joint, mark location of the second ring on top chord by drilling a 9/16″ hole. Use the pre-drilled bottom chord as a pattern.
Note: This point must be located by drilling in place. **Keep drill vertical.**

- Recheck alignment on all members. Be sure heel assemblies are firmly against blocks. Place additional blocks where needed.
- Disassemble the truss.
- Complete pattern truss by cutting and drilling members. Drill all rings in each member on same side. See cutting diagrams.
- Use disassembled members as pattern to cut and drill remaining members for all trusses to be built.
- Assemble trusses using blocks and chalk lines as a jig. Use connections as shown in table.
  1. Assemble heel joints according to pattern.
  2. Assemble peak joint in jig by placing ring between chords and by running bolt through chords and diagonals. Bring nut up finger tight.
  3. Nail, spike, or bolt bottom chord splice. Space nails, spikes or bolts as shown in Figure 13.
  4. Place remaining members and complete all nailed joints possible while truss is in jig.
  5. Remove truss from jig and nail remaining joints.
  6. Tighten all bolts.

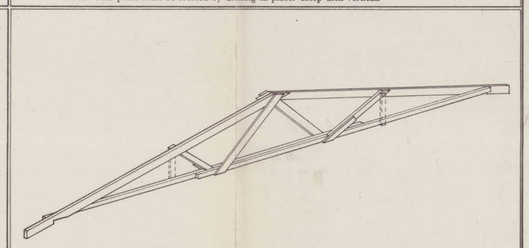
12



Place two bolts near each panel point of bottom chord. Illustrations show two possible methods. (Use of one bolt on each side of joint is preferred method.) Space remaining bolts throughout length of splice.

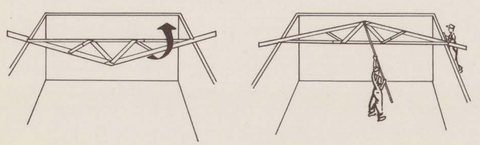
Place eight nails or spikes near each panel point of bottom chord. Illustrations show two possible methods. (Use of four nails or spikes on each side of joint is preferred method.) Space remaining nails or spikes throughout length of splice.

13 Bolt, nail or spike bottom chord splice according to connection table.



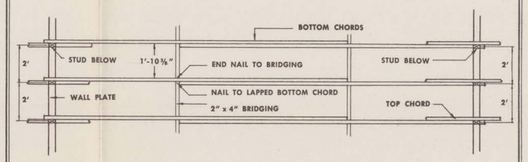
14 Sketch shows member arrangement for 3/12 truss. Dotted lines indicate additional members needed for Pattern "B."

Length shown for bottom chord splice must be maintained to provide stiffness.
Short diagonals must be in tight bearing against bottom chord.



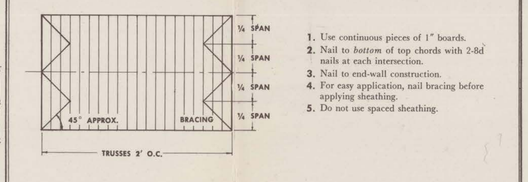
15 To erect the truss, place it in an inverted position with the ends resting on the wall plates.

Use a pole to swing the truss into position.



TOP VIEW SHOWING TRUSS SPACING

16 To space trusses, measure distances on wall plates. Note that top chord falls over stud on one side, bottom chord falls over stud on opposite side.
Brace bottom chords by cutting 2″ x 4″ bridging between trusses exactly as shown.



PATTERN OF TOP CHORD BRACING

17
1. Use continuous pieces of 1″ boards.
2. Nail to *bottom* of top chords with 2-8d nails at each intersection.
3. Nail to end-wall construction.
4. For easy application, nail bracing before applying sheathing.
5. Do not use spaced sheathing.

Brace top chords of the trusses using the pattern shown.

MEMBER SIZES AND CONNECTIONS

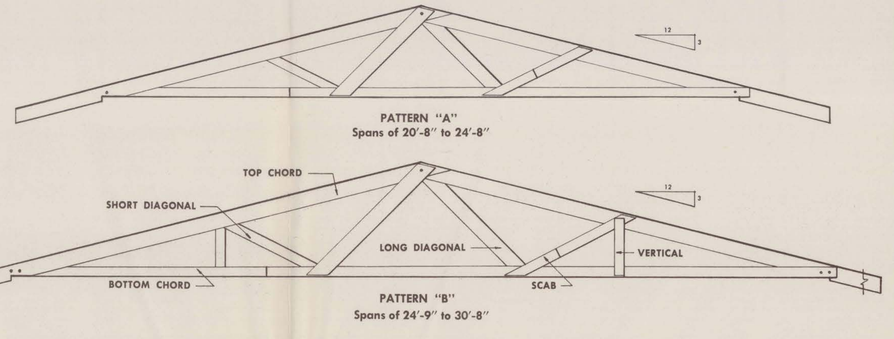
Use pattern shown for out-to-out span desired

MEMBERS†	PATTERN "A"	PATTERN "B"
SPAN ➡	21′ 22′ 23′ 24′	25′ 26′ 27′ 28′ 29′ 30′
Two Top Chords	Two 2″ x 6″ x 16′	Two 2″ x 6″ x 18′ / Two 2″ x 6″ x 20′
Two Bottom Chords	Two 2″ x 4″ x16′	Two 2″ x 4″ x 18′ / Two 2″ x 4″ x 20′ / Two # 2″ x 4″ x 22′
Two Long Diagonals**	One 1″ x 6″ x 10′	One 1″ x 6″ x 12′ / One 1″ x 6″ x 14′
Two Short Diagonals	One 2″ x 4″ x 8′	One 2″ x 4″ x 10′
Two Verticals	None	One 1″ x 4″ x 6′
Two Scabs	One 1″ x 4″ x 4′	

† Use 1100 p.s.i. stress grade. Grading provisions to be applied to entire length of piece. Knots or other strength defects should not occur at sections that are notched or drilled for rings.
* At spans greater than 29′-8″ two bottom chords 20′-1⅜″ long are required. Precut 1′-10⅜″ from each 23′ piece and use as bottom chord bridging. See Figure 16.
** Laterally brace long diagonals at center with scabs or solid bridging.

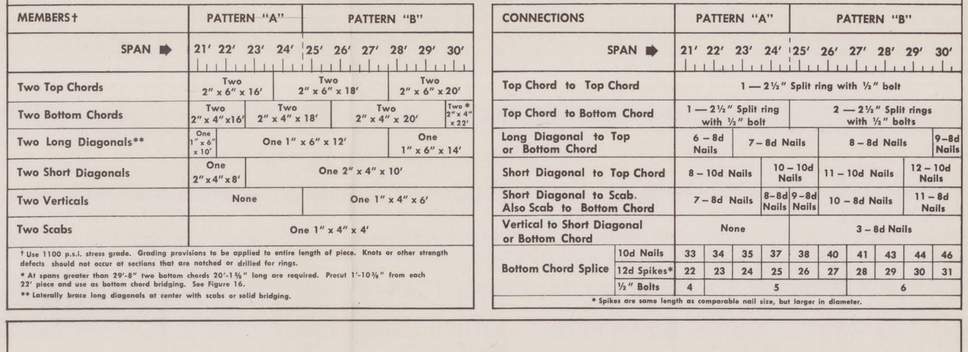
CONNECTIONS		PATTERN "A"				PATTERN "B"					
SPAN ➡		21′	22′	23′	24′	25′	26′	27′	28′	29′	30′
Top Chord to Top Chord		1 — 2½″ Split ring with ½″ bolt									
Top Chord to Bottom Chord		1 — 2½″ Split ring with ½″ bolt				2 — 2½″ Split rings with ½″ bolts					
Long Diagonal to Top or Bottom Chord		6 – 8d Nails		7 – 8d Nails		8 – 8d Nails			9–8d Nails		
Short Diagonal to Top Chord		8 – 10d Nails			10 – 10d Nails	11 – 10d Nails			12 – 10d Nails		
Short Diagonal to Scab. Also Scab to Bottom Chord		7 – 8d Nails		8–8d Nails	9 – 8d Nails	10 – 8d Nails			11 – 8d Nails		
Vertical to Short Diagonal or Bottom Chord		None				3 – 8d Nails					
Bottom Chord Splice	10d Nails	33	34	35	37	38	40	41	43	44	46
	12d Spikes*	22	23	24	25	26	27	28	29	30	31
	½″ Bolts	4	5			6					

* Spikes are same length as comparable nail size, but larger in diameter.



CUTTING DIAGRAMS

Drill 2½″ split rings exactly as shown. Those rings indicated by hatched line are located by drilling 9/16″ hole in place on pattern. They occur on same side of member as ring shown in solid line.
Cuts marked during pattern assembly are shown by dotted lines.

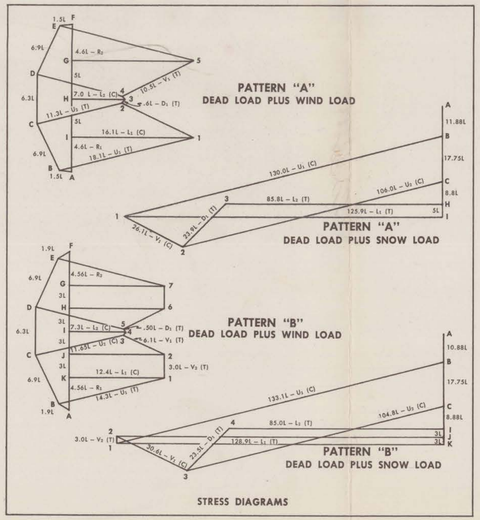


END DIMENSIONS ("d") FOR VARIOUS SPANS
Based on Standard Member Lengths Shown in Member Size Table.

End dimensions given allow the maximum possible overhang. For lesser overhang reduce this dimension.

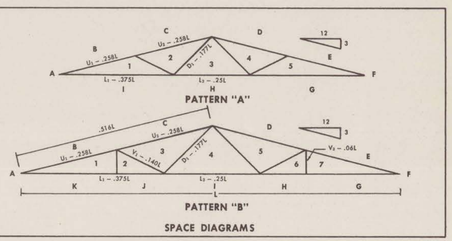
SPAN	20′ 8″	21′ 8″	22′ 8″	23′ 8″	24′ 8″	25′ 8″	26′ 8″	27′ 8″	28′ 8″	29′ 8″	30′ 8″
END DIMENSION ("d")	4′ 4″	3′ 9″	3′ 3″	2′ 9″	4′ 3″	3′ 8″	3′ 3″	2′ 8″	4′ 2″	3′ 8″	3′ 2″

DESIGN DATA



STRESS DIAGRAMS

LOADING VALUES	
SNOW: 25 p.s.f. horizontal projection	DEAD: 18.5 p.s.f. horizontal projection (Plaster or sheet-material ceiling)
WIND: 23 p.s.f. upward normal	



SPACE DIAGRAMS

UNIVERSITY OF ILLINOIS · SMALL HOMES COUNCIL · URBANA, ILLINOIS

3/12 — SLOPE TRUSS FOR 20′-8″ TO 30′-8″ SPANS

(2′ ON CENTER) 15B

Willard J. Worth — Sydney B. Berry

A.I.A. 19 B 3 (b)

Price: 25 cents